HERRING STORER ACOUSTICS

Our ref: 29096-1-22067

16 February 2021

Planning Solutions
Level 1, 251 St Georges Terrace
Perth, WA 6000

Attention: Rebekah Hampson
Address: Rebekah.hampson@planningsolutions.com.au

Dear Rebekah,

36 GREAT EASTERN HIGHWAY, SOMERVILLE – MECHANICAL PLANT ACOUSTIC CONSULTANCY

SUMMARY

Based on information provided, noise emissions from mechanical plant associated with the development at 36 Great Eastern Highway, Somerville would meet the *Environmental Protection (Noise) Regulations 1997*.

CRITERIA

The allowable noise level at the surrounding locales is prescribed by the *Environmental Protection (Noise) Regulations 1997*. Regulations 7 & 8 stipulate maximum allowable external noise levels determined by the calculation of an influencing factor, which is then added to the base levels shown below. The influencing factor is calculated for the usage of land within two circles, having radii of 100m and 450m from the premises of concern.

TABLE 1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day Period)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Commercial premises	All Hours	60	75	80

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax\ Slow}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;
(b) is present for more at least 10% of the representative assessment period; and
(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and
(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

Where the noise emission is not music, if the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 2 below.

TABLE 2 – ADJUSTMENTS TO MEASURED NOISE LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

The nearest affected locations have been identified as:

1 – Residential Premises on Gatacre Drive to the north east,
2 – Noise Sensitive Premises of Acclaim Goldminer Tourist Caravan Park to the south west,
3 - Industrial Premises "Penn's Cartage" to the north.

The influencing factor at the residential premises has been conservatively estimated at + 8 dB as follows:

Commercial Premises within the Inner Circle	30%	+1.5
Commercial Premises within the Outer Circle	10%	+0.5
Industrial Premises within the Inner Circle	10%	+1
Industrial Premises within the Outer Circle	<10%	+0
Minor Roads within the Inner Circle (GEH)		+2
TOTAL		**+5**

FIGURE 1 – AREA MAP

Accordingly, the Assigned Noise Levels are as per Table 4 below.

TABLE 4 - ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Residential Premises	0700 – 1900 hours Monday to Saturday	50	60	70
	0900 - 1900 hours Sunday and Public Holidays	45	55	70
	1900 – 2200 hours all days	45	55	60
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	40	50	63
Industrial Premises	All Hours	65	80	90

Notes: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

CALCULATED NOISE LEVELS

Based on information provided we believe that the development will have an air-conditioning unit for each module (total 60), the office and gym, as well as a single kitchen exhaust associated with the kitchen.

TABLE 5 – SOUND POWER LEVEL

Item	Sound Power Level dB(A)
Air conditioning Unit	68
Kitchen Exhaust	75

Using the above sound power level and existing development plan, modelling software “SoundPLAN” was utilised to calculate the noise highest noise level at each of the premises, shown below.

TABLE 6 – CALCULATED NOISE LEVELS

Item	Noise Level dB(A)
1 – Residential Premises	31
2 – Acclaim Goldminer	33
3 – Penn’s Cartage	34

ASSESSMENT

Due to the nature of noise emissions, it is unlikely for the emissions to contain annoying characteristics, however to ensure a conservative assessment the penalty associated with “Tonality” has been applied. adjustments in Table 7 below are applicable.

TABLE 7 – APPLICABLE ADJUSTMENTS AND ADJUSTED L_{A10} NOISE LEVELS, dB(A)

Measurement Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)		Adjusted Noise Level, dB(A)
		Where Noise Emission IS music		
		Where **tonality** is not present	Where **toanlity** is present	
1 – Residential Premises	31	+ 5	-	36
2 – Acclaim Goldminer	33	+ 5	-	38
3 – Penn’s Cartage	34	+5	-	39

Table 8 shows the applicable Assigned Noise Levels, and assessable noise level emissions associated for the scenario associated with the mechanical plant.

TABLE 8 – ASSESSMENT OF NOISE LEVEL EMISSIONS

Measurement Location	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L_{A10} Assigned Level (dB)	Exceedance to Assigned Noise Level (dB)
1 – Residential Premises	36	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	40	Complies
2 – Acclaim Goldminer	38	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	40	Complies
3 – Penn's Cartage	39	All Hours	65	Complies

CONCLUSIONS

Noise from the proposed development to the adjacent premises would comply with the *Environmental Protection (Noise) Regulations 1997*.

We trust the above meets your requirements on this matter. Should you have any queries, please do not hesitate to contact this office.

Yours faithfully,
For **HERRING STORER ACOUSTICS**

Geoffrey Harris

PLANNING SOLUTIONS
36 GREAT EASTERN HIGHWAY
SOMERVILLE

STATE PLANNING POLICY 5.4
NOISE MANAGEMENT PLAN

FEBRUARY 2022

OUR REFERENCE: 29095-1-22067

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DOCUMENT CONTROL PAGE

ACOUSTIC ASSESSMENT

36 GREAT EASTERN HIGHWAY
SOMERVILLE

Job No: 22067

Document Reference: 29095-1-22067

FOR

PLANNING SOLUTIONS

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APPENDICIES

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Planning Solutions to undertake an acoustical assessment of noise received within the proposed development 36 Great Eastern Highway, in Somerville.

As part of the study, the following was carried out:

- Obtain noise levels associated with vehicle movements on Great Eastern Highway.
- Determine by noise modelling the noise levels that would be received within the development from vehicles travelling on Great Eastern Highway.
- Assess the predicted noise levels received at residence for compliance with the requirements of the WAPC State Planning Policy 5.4 *"Road and Rail Noise"* (SPP 5.4).
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

For information, the development plan is attached in Appendix A.

2. SUMMARY

Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

The policy states that the "outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

The Policy states the following acceptable internal noise levels:

Internal

Living and Work Areas	$L_{Aeq(Day)}$ of 40 dB(A)
Bedrooms	$L_{Aeq(Night)}$ of 35 dB(A)

For this development, compliance with the requirements of SP 5.4, noise modelling and assessment are based on the day period for residence located adjacent to the Great Eastern Highway, as compliance with the day period would yield compliance with the night period.

Noise contours from vehicles travelling along the Great Eastern Highway are provided in Appendix B, with lots requiring "Quiet House Design" Packages and/or Notification on the Title shown in Appendix C.

For this development, the use of "Quiet House Design" is recommended as the preferred type of noise control, as the orientation of lots and future detail design of individual lots can readily reduce noise impact from Great Eastern Highway to achieve compliance with the above criteria.

3. CRITERIA

3.1 NOISE

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 *"Road and Rail Noise".* The requirements of State Planning Policy 5.4 are outlined below.

POLICY APPLICATION (Section 4)

When and where it applies (Section 4.1)

SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:

a) *noise-sensitive land-use within the policy's trigger distance of a transport corridor as specified in* ***Table 1****;*

b) *New or major upgrades of roads as specified in* ***Table 1*** *and maps* ***(Schedule 1,2 and 3);*** *or*

c) *New railways or major upgrades of railways as specified in maps (****Schedule 1, 2 and 3);*** *or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.*

Policy trigger distances (Section 4.1.2)

Table 1 *identifies the State's transport corridors and the trigger distances to which the policy applies.*

The designation of land within the trigger distances outlined in ***Table 1*** *should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.*

*Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/ mitigation required. An initial screening assessment (****guidelines: Table 2: noise exposure forecast****) will determine if the lot is affected and to what extent."*

TABLE 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES

Transport corridor classification	***Trigger distance***	***Distance measured from***
Roads		
Strategic freight and major traffic routes *Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume*	*300 metres*	*Road carriageway edge*
Other significant freight/traffic routes *These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes)*	*200 metres*	*Road carriageway edge*
Passenger railways		
	100 metres	*Centreline of the closest track*
Freight railways		
	200 metres	*Centreline of the closest track*

Proponents are advised to consult with the decision making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.

POLICY MEASURES (Section 6)

The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.

Noise Targets (Section 6.1)

***Table 2** sets out noise targets that are to be achieved by proposals under which the policy applies. Where exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.*

In the application of the noise targets the objective is to achieve:

- *indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*
- *a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.*

It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.

TABLE 2: NOISE TARGETS

Proposals	***New/Upgrade***	***Noise Targets***		
		Outdoor		***Indoor***
		Day (L_{Aeq}(Day) dB) (6 am-10 pm)	***Night (L_{Aeq}(Night)dB) (10 pm-6 am)***	***(L_{Aeq} dB)***
Noise-sensitive land-use and/or development	*New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor*	*55*	*50*	*L_{Aeq} (Day) 40(Living and work areas)* *L_{Aeq} (Night) 35 (bedrooms)*
Roads	*New*	*55*	*50*	*N/A*
	Upgrade	*60*	*55*	*N/A*
Railways	*New*	*55*	*50*	*N/A*
	Upgrade	*60*	*55*	*N/A*

Notes:

- *The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.*
- *For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.*
- *The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.*
- *Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.*

Noise Exposure Forecast (Section 6.2)

*When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/ or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:*

- *no further measures are required.*
- *noise-sensitive land-use and/or development is acceptable subject to deemed-to-comply mitigation measures; or*
- *noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/ or development is subject to mitigation measures outlined in a noise management plan."*

3.2 APPROPRIATE CRITERIA

Based on the above, the following criteria are proposed for this development:

External	
Day	55 dB(A) L_{Aeq}
Night	50 dB(A) L_{Aeq}
Internal	
Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

Additional to these criteria, noise received at an outdoor area, where practicable, should also achieve an L_{Aeq} of 50 dB(A) during the night period.

4. MEASUREMENTS AND OBSERVATIONS

The noise measurements were conducted on 9 February 2022 for a short term period during peak hour to determine the L_{A10} noise level.

Utilising this measurement, reference to the DEFRA publication has been sought and the difference between the $L_{A10,18hr}$ and the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ has been calculated. The results of the measurement and the determination of the $L_{Aeq(Day)}$ and $L_{Aeq(Night)}$ are shown in Table 4.1.

Noise measurements were conducted with a Svan 948 Sound Level Meter. The Sound Level Meter was calibrated prior to and after use with a Bruel and Kjaer 4230 Calibrator. All equipment used is currently NATA laboratory calibrated. Calibration certificates are available on request.

TABLE 4.1 : SUMMARY OF MEASURED NOISE LEVELS

Measurement Location	Measured/Calculated Noise Level, dB(A)		
	L_{A10}	$L_{Aeq, day (6am to 10pm)}$	$L_{Aeq, night (10pm to 6am)}$
10m Edge of 36 Great Eastern Highway	64.7	61.1	54.5

5. MODELLING

To determine the noise levels from traffic from the Great Eastern Highway, acoustic modelling was carried out using SoundPlan, using the Calculation of Road Traffic Noise (CoRTN)[1] algorithms.

The input data for the model included:

- Topographical data, with the ground level within the development based on natural ground levels as per Google Earth.
- Development layout as supplied by client (Shown in Appendix A).
- Road Traffic data as per Table 5.1.
- Adjustments as listed in Table 5.2.

TABLE 5.1 - NOISE MODELLING INPUT DATA

Parameter	Great Eastern Highway (Current) 2020	Great Eastern Highway (Future) 2042
Traffic Volumes	8,463 vpd	13,084 vpd
Percentage traffic 0600 – 2400 hours (Assumed)	94%	94%
Heavy Vehicles (%) (Assumed)	18.9%	18.9%
Speed (km/hr)	60km/hr	60km/hr
Road Surface	Chip Seal	Dense Grade Asphalt

1 *Calculation of Road Traffic Noise* UK Department of Transport 1987

TABLE 5.2 – ADJUSTMENTS FOR NOISE MODELLING

Description	Value
Façade Reflection Adjustment	+2.5 dB
Conversion from $L_{A10\ (18\ hour)}$ to $L_{Aeq\ (16\ hour)}$ (Day)	-3.6 dB*

* Based on measured results listed in Table 4.1.

Based on the assessment, the difference between the $L_{Aeq,(16hr)}$ and $L_{Aeq,(8hr)}$ is -6.6 dB, hence, the day period is the critical period for compliance. Hence, achieving compliance with the day period criteria would also result in compliance with the night period criteria.

6. DISCUSSION / RECOMMENDATION

Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

The policy states that the "outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

The Policy states the following acceptable internal noise levels:

Internal

Living and Work Areas	$L_{Aeq(Day)}$ of 40 dB(A)
Bedrooms	$L_{Aeq(Night)}$ of 35 dB(A)

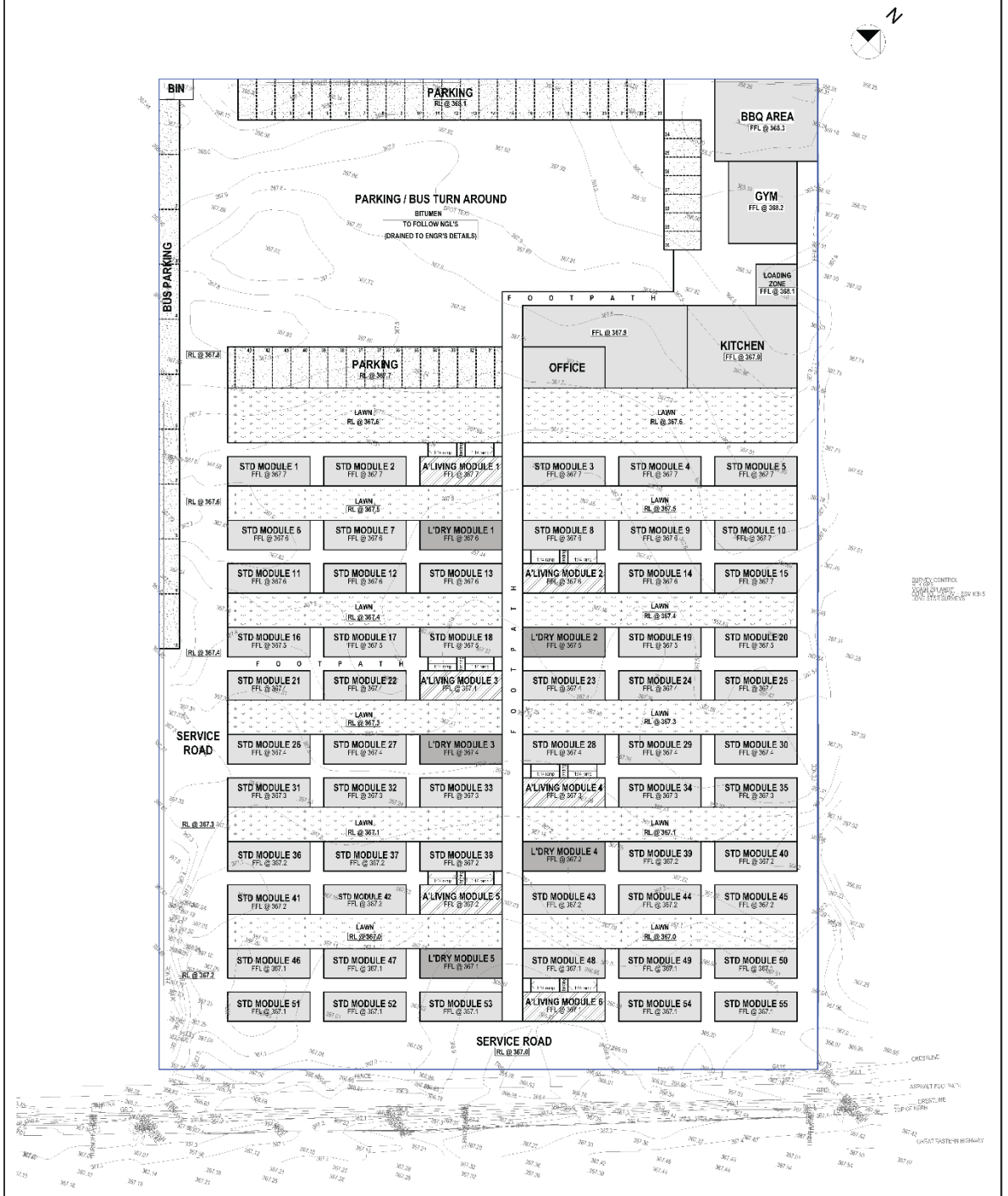
For this development, compliance with the requirements of SP 5.4, noise modelling and assessment are based on the day period for residence located adjacent to Great Eastern Highway, as compliance with the day period would yield compliance with the night period.

Noise contours from vehicles travelling Great Eastern Highway are provided in Appendix B, with lots requiring "Quiet House Design" Packages and/or Notification on the Title shown in Appendix C.

For this development, the use of "Quiet House Design" is recommended as the preferred type of noise control, as the orientation of lots and future detail design of individual lots can readily reduce noise impact from Great Eastern Highway to achieve compliance with the above criteria.

APPENDIX A

SUBDIVISION PLAN



GREAT EASTERN HIGHWAY

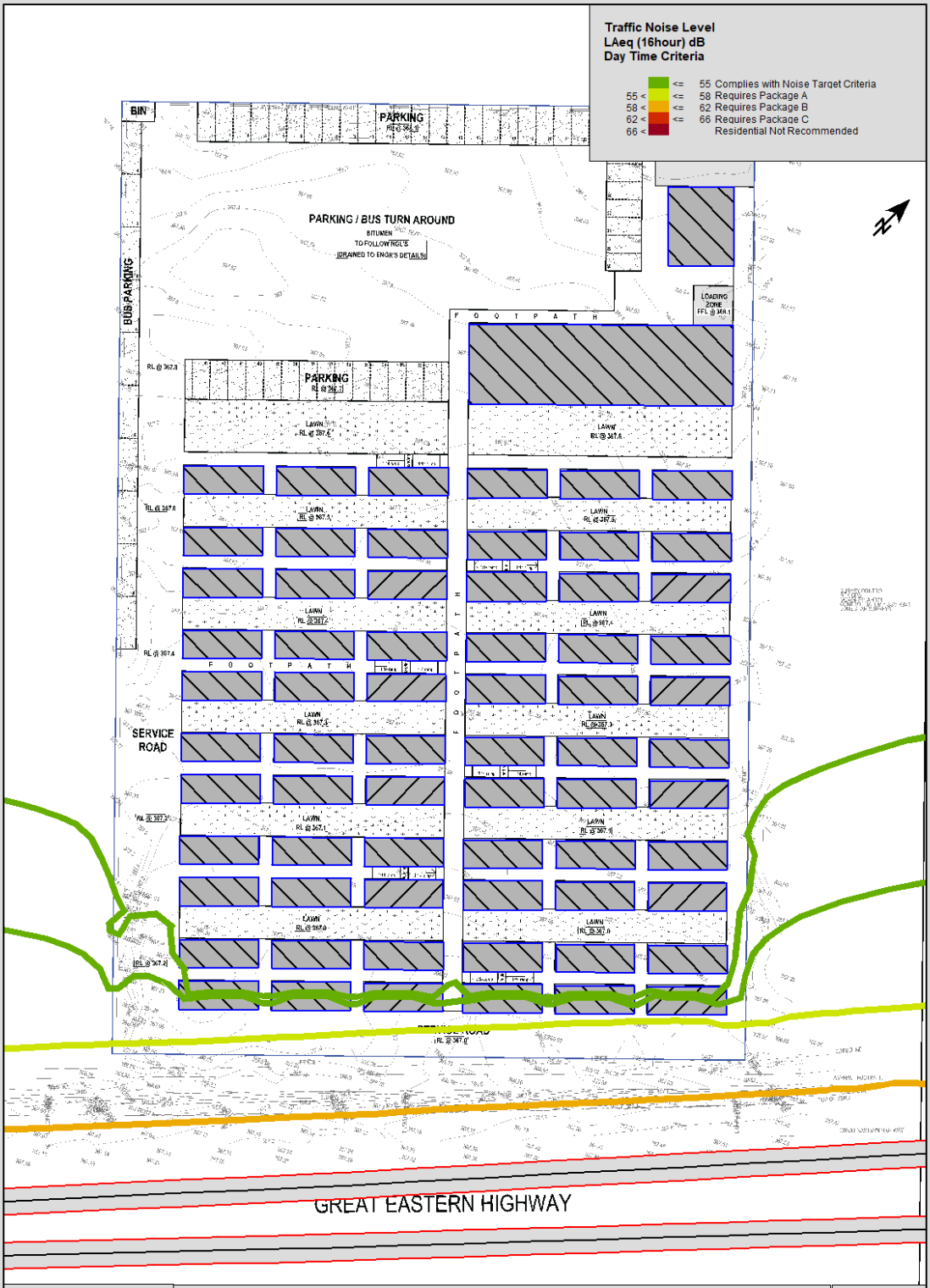
Rev	Details	Date
01	SITING	17/01/2022

Name: JASCORE
Address: 30 GREAT EASTERN HIGHWAY
Title: SITE PLAN
Drawing No: A/C-A

Date: 17/01/2022
Scale: 1:250
Drawn: VA-RG
Revision: 01

APPENDIX B

$L_{Aeq(16hr)}$ DAY NOISE CONTOURS



Herring Storer Acoustics	36 GREAT EASTERN HIGHWAY, SOMERVILLE Future Traffic Volumes LAeq (16hour) Day Noise Level Contour	Appendix B

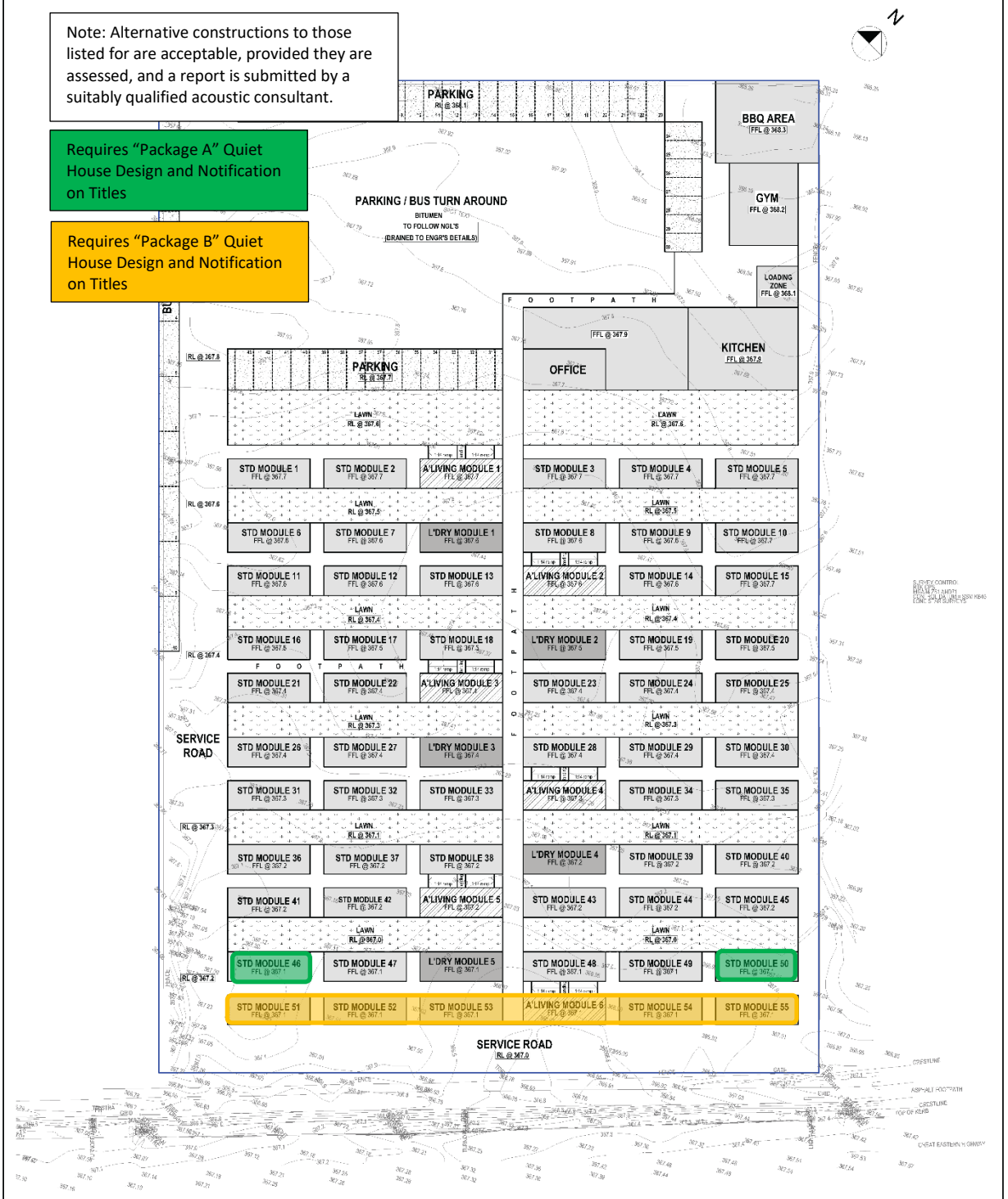
APPENDIX C

LOTS REQUIRING “QUIET HOUSE” DESIGN AND / OR NOTIFICATIONS

Note: Alternative constructions to those listed for are acceptable, provided they are assessed, and a report is submitted by a suitably qualified acoustic consultant.

Requires “Package A” Quiet House Design and Notification on Titles

Requires “Package B” Quiet House Design and Notification on Titles



APPENDIX D

"QUIET HOUSE" DESIGN – GENERAL INFORMATION

Road Traffic and Passenger Rail - Quiet House Requirements
(*Based on Table 3 of State Planning Policy 5.4 2019*)

Exposure Category	Orientation to corridor	Acoustic ratings					Mechanical ventilation/air conditioning considerations
		Walls	**External doors**	**Windows**	**Roofs and ceilings of highest floors**	**Outdoor Living areas**	
A **Quiet House A**	**Facing**	**Bedroom and Indoor Living and work areas** ➢ Rw + Ctr 45dB	**Bedrooms**: ➢ R_w+C_{tr} 28dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 25dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB	➢ R_w+C_{tr} 35dB	➢ At least one outdoor living area located on the opposite side of the building from the transport corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum **2 metres** height above ground level	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of **Rw 40dB** into sensitive spaces
	Side On		**Bedrooms**: ➢ R_w+C_{tr} 25dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 22dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 22 dB			
	Opposite		No specific requirements	No specific requirements			
B **Quiet House B**	**Facing**	**Bedroom and indoor living and work areas** ➢ R_w+C_{tr} 50dB	**Bedrooms** ➢ R_w+C_{tr} 31dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 31 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB	➢ **R_w+C_{tr} 35dB**	➢ At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum **2.4 metres** height above ground level	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of **Rw 40dB** into sensitive spaces
	Side-On		**Bedrooms** ➢ R_w+C_{tr} 28dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB			
	Opposite		**Bedrooms** ➢ R_w+C_{tr} 25dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 25dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 22 dB			
C **Quiet House C**	**Facing**	**Bedroom and indoor living and work areas** ➢ R_w+C_{tr} 50dB	**Bedrooms** ➢ No External doors to bedrooms facing the corridor **Indoor Living and work areas** ➢ Rw+Ctr 31dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 31dB) **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 31dB	➢ **R_w+C_{tr} 40dB**	➢ At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum **2.4 metres** height above ground level	➢ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces.
	Side-on		**Bedrooms** ➢ R_w+C_{tr} 31dB **Indoor Living and work areas** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 31 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB			
	Opposite		**Bedrooms**: ➢ R_w+C_{tr} 28dB **Indoor Living and work areas:** ➢ R_w+C_{tr} 28dB	**Bedrooms**: Window size dependant ➢ **Minimum** R_w+C_{tr} 28 dB **Indoor Living and work areas** Window size dependant ➢ **Minimum** R_w+C_{tr} 25 dB			

APPENDIX E

MRWA FUTURE TRAFFIC DATA

mainroads WESTERN AUSTRALIA

SITE 16193

Hourly Volume

Great Eastern Hwy (H005)

East of Atbara St (SLK 587.92)

2020/21
Monday to Friday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	11	10	21	0	1	1	4.8
01:00	14	10	24	1	1	2	8.3
02:00	10	14	24	0	3	3	12.5
03:00	18	31	49	1	4	5	10.2
04:00	29	191	220	8	34	42	19.1
05:00	133	578	711	34	80	114	16.0
06:00	189	497	686	42	100	142	20.7
07:00	214	492	706	60	96	156	22.1
08:00	290	398	688	70	93	163	23.7
09:00	290	316	606	69	80	149	24.6
10:00	292	303	595	68	77	145	24.4
11:00	304	296	600	71	79	150	25.0
12:00	362	348	710	78	76	154	21.7
13:00	323	340	663	70	84	154	23.2
14:00	362	287	649	65	73	138	21.3
15:00	421	280	701	76	62	138	19.7
16:00	624	278	902	86	55	141	15.6
17:00	502	191	693	79	37	116	16.7
18:00	279	88	367	42	14	56	15.3
19:00	89	57	146	12	7	19	13.0
20:00	47	42	89	6	5	11	12.4
21:00	43	32	75	4	3	7	9.3
22:00	30	18	48	1	2	3	6.3
23:00	20	15	35	2	2	4	11.4
TOTAL	4896	5112	10008	945	1068	2013	20.1

Peak Statistics

AM	TIME	11:45	06:30	06:45	11:30	06:30	06:45
	VOL	364	588	762	80	116	172
PM	TIME	16:15	12:30	16:15	16:15	13:15	13:15
	VOL	659	363	928	90	86	156